

1 Gb Radiation Hardened Nonvolatile Memory Development, Phase I

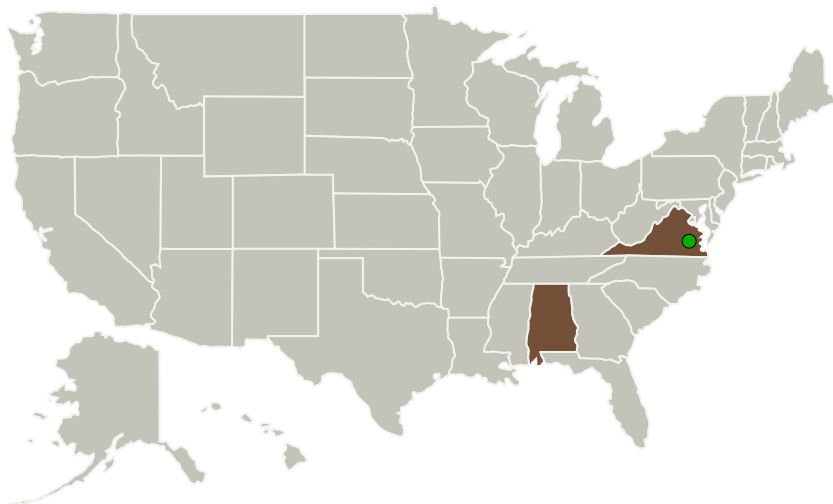
Completed Technology Project (2011 - 2011)



Project Introduction

The objective of this effort is to identify, characterize and develop advanced semiconductor materials and fabrication process techniques, and design and produce a Gigabit (GB)-scale high density, radiation hardened (RH), SONOS-based nonvolatile memory (NVM) in a standard, high density CMOS technology with feature sizes approaching the 90nm technology node. Highly reliable, RH SWAP-efficient, high-density NVM provides for the deployment of more capable, flexible and responsive hardware designs leading to improved mission performance and enhanced data storage capability with less system operational complexity and reduced system vulnerability to natural and weapons generated radiation environments. By leveraging state-of-the-art (SOA) commercial NVM technologies and implementing a combination of these elements with the proper memory cell architecture, radiation hardened device design, and advanced fabrication processes, we are confident we can produce a 1Gb RH NVM using currently available CMOS process modules at or below the 90 nm fabrication technology node. The unique materials and process technologies to be investigated in our approach include composite high-k dielectric thin-film oxide materials, shallow trench isolation, atomic layer deposition, p-channel silicon-insulator-nitride-oxide-silicon (SINOS) NVM architecture, and RH CMOS peripheral circuitry.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Scientific, Inc.	Lead Organization	Industry	Huntsville, Alabama
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Alabama	Virginia

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137795>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Scientific, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

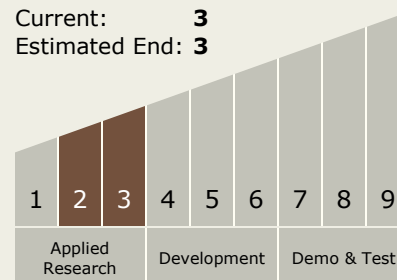
Carlos Torrez

Principal Investigator:

Jeff Dame

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 3



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Technology Areas

Primary:

- TX10 Autonomous Systems
 - └ TX10.1 Situational and Self Awareness
 - └ TX10.1.4 Hazard Assessment

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System